

RECEIVED #8

APR 17 2001

1648

TECH CENTER 1600/2900

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/680,228

DATE: 04/05/2001

TIME: 09:03:49

Input Set : A:\ES.txt

Output Set : N:\CRF3\04052001\I680228.raw

ENTERED

3 <110> APPLICANT: Ellis, et al.

5 <120> TITLE OF INVENTION: PREVENTION OF MYOCARDITIS, ABORTION AND INTRAUTERINE INFECTION

ASSOCIATED

6 WITH PORCINE CIRCOVIRUS-2

8 <130> FILE REFERENCE: 454313-2340.2

10 <140> CURRENT APPLICATION NUMBER: 09/680,228

11 <141> CURRENT FILING DATE: 2000-10-06

13 <150> PRIOR APPLICATION NUMBER: PCT/EP00/08781

14 <151> PRIOR FILING DATE: 2000-08-28

16 <150> PRIOR APPLICATION NUMBER: 09/583,350

17 <151> PRIOR FILING DATE: 2000-05-31

19 <150> PRIOR APPLICATION NUMBER: 60/151,564

20 <151> PRIOR FILING DATE: 1999-08-31

22 <160> NUMBER OF SEQ ID NOS: 8

24 <170> SOFTWARE: PatentIn version 3.0

26 <210> SEQ ID NO: 1

27 <211> LENGTH: 1767

28 <212> TYPE: DNA

29 <213> ORGANISM: Porcine circovirus

31 <400> SEQUENCE: 1

```

32 aattcaacct taacctttct tattctgtag tattcaaagg gcacagagcg ggggtttgag      60
34 cccctcctcg ggggaagaaa gtcattaata ttgaatctca tcatgtocac cgcccaggag      120
36 ggcgttctga ctgtggttcg cttgacagta tatccgaagg tgcgggagag gcgggtgttg      180
38 aagatgccat ttttcttctt ccagcggtaa cgggtggcggg ggtggacgag ccagggggcg      240
40 cggcggagga tctggccaag atggctgcgg gggcgggtgc ttcttctccg gtaacgcctc      300
42 cttggatacg tcatatctga aaacgaaaga agtgcgctgt aagtattacc agcgcacttc      360
44 ggcagcggca gcacctcggc agcacctcag cagcaacatg ccgagcaaga agaatggaag      420
46 aagcggaccc caaccccata aaaggtgggt gttcactctg aataatcctt ccgaagacga      480
48 gcgcaagaaa atacgggatc ttccaatatc cctatttgat tattttattg ttggcgagga      540
50 gggtaatgag gaaggacgaa cacctcacct ccagggggtc gctaattttg tgaagaagca      600
52 gacttttaat aaagtgaagt ggtatttggg tgcccgtgcg cacatcgaga aagcgaaagg      660
54 aacagatcag cagaataaag aatactgcag taaagaaggc aacttactga tggagtgtgg      720
56 agctcctaga tctcagggac aacggagtga cctgtctact gctgtgagta ccttggttga      780
58 gagcgggagt ctggtgaccg ttgcagagca gcacctgta acgtttgtca gaaatttccg      840
60 cgggctggct gaacttttga aagtgcggcg gaaaaatgcag aagcgtgatt ggaagactaa      900
62 tgtacacgtc attgtggggc cacctgggtg tggtaaaagg aaatgggctg ctaattttgc      960
64 agaccgggaa accacatact ggaaaccacc tagaaacaag tggtgggatg gttaccatgg      1020
66 tgaagaagtg gttgttattg atgactttta tggtcggtcg ccctgggatg atctactgag      1080
68 actgtgtgat cgatatccat tgactgtaga gactaaagggt ggaactgtac cttttttggc      1140
70 ccgcagtatt ctgattacca gcaatcagac cccgttggaa tggtaactct caactgctgt      1200
72 ccagctgta gaagctcttt atcggaggat tacttcttg gtattttgga agaattgtac      1260
74 agaacaatcc acggagggaag ggggccagtt cgtcaccctt tcccccccat gccctgaatt      1320
76 tccatatgaa ataaattact gagtcttttt tatcaattcg taatggtttt tattattcat      1380
78 taaggggttaa gtggggggtc tttaagatta aattctctga attgtacata catggttaca      1440
80 cggatattgt attcctggtc gtatatactg ttttcgaacg cagtgcgag gcctacgtgg      1500
82 tctacatttc cagcagtttg tagtctcagc cacagctggt ttcttttggt gtttggttgg      1560
84 aagtaatcaa tagtggaatc taggacaggt ttgggggtaa agtagcggga gtggtaggag      1620
86 aagggtcggt ttatggtatg gcgggaggag tagtttcat aggggtcata ggtgagggct      1680

```

RAW SEQUENCE LISTING

DATE: 04/05/2001

PATENT APPLICATION: US/09/680,228

TIME: 09:03:49

Input Set : A:\ES.txt

Output Set: N:\CRF3\04052001\I680228.raw

```

88 gtggcctttg ttacaaagtt atcatctaga ataacagcac tggagccac tcccctgtca 1740
90 cctgggtga tcggggagca gggccag 1767
93 <210> SEQ ID NO: 2
94 <211> LENGTH: 1767
95 <212> TYPE: DNA
96 <213> ORGANISM: Porcine circovirus
98 <400> SEQUENCE: 2
99 aattcaacct taacctttct tattctgtag tattcaaagg gcacagagcg ggggtttgag 60
101 cccctcctg ggggaagaaa gtcattaata ttgaatctca tcatgtccac cgcccaggag 120
103 ggcgttttga ctgtggttcg cttgacagta tatccgaagg tgcgggagag gcgggtgttg 180
105 aagatgccat ttttccttct ccagcggtaa cgggtgcggg ggtggacgag ccaggggcgg 240
107 cggcgaggga tctggccaag atggctgcgg gggcggtgtc ttcttctcgg gtaacgcctc 300
109 cttggatacg tcatatctga aaacgaaaga agtgcgctgt aagtattacc agcgcacttc 360
111 ggcagcggca gcacctcgcc agcacctcag cagcaacatg cccagcaaga agaattggaag 420
113 aagcggaccc caacccccata aaagggtggg gttaactctg aataatcctt ccgaagacga 480
115 gcgcaagaaa atacgggagc ttccaatata cctattttgat tattttattg ttggcgagga 540
117 gggtaattgag gaaggacgaa cacctcacct ccagggttc gctaattttg tgaagaagca 600
119 gacttttaaat aaagtgaagt ggtatttggg tgcccgtgc cacatcgaga aagcgaaagg 660
121 aacagatcag cagaataaag aatactgcag taaagaaggc aacttactga tggagtgtgg 720
123 agctcctaga tctcagggac aacggagtga cctgtctact gctgtgagta ccttggttga 780
125 gagcgggagt ctggtgaccg ttgcagagca gcacctgta acgtttgtca gaaatttccg 840
127 cgggctggct gaacttttga aagtgaagcg gaaaatgcag aagcgtgatt ggaagactaa 900
129 tgtacacgtc attgtggggc cacctgggtg tggtaaaagc aaatgggctg ctaattttgc 960
131 agaccgggaa accacatact ggaaaccacc tagaaacaag tgggtggatg gttaccatgg 1020
133 tgaagaagtg gttgttattg atgactttta tggctggctg ccctgggatg atctactgag 1080
135 actgtgtgat cgatatccat tgactgtaga gactaaagggt ggaactgtac cttttttggc 1140
137 ccgcagtatt ctgattacca gcaatcagac cccgttgga tgggtactct caactgctgt 1200
139 cccagctgta gaagctcttt atcggaggat tacttccttg gtatttttga agaattgctac 1260
141 agaacaatcc acggaggaag ggggccagtt cgtcacctt tccccccat gccctgaatt 1320
143 tccatatgaa ataaattact gagtcttttt tatcacttcg taatggtttt tattattcat 1380
145 taaggggttaa gtgggggttc tttaagatta aattctctga attgtacata catggttaca 1440
147 cggatattgt attcctggtc gtatatactg ttttcgaacg cagtgcgag gcctacgttg 1500
149 tctacatttc cagtagtttg tagtctcagc cacagctgat ttcttttgtt gtttggttg 1560
151 aagtaatcaa tagtggaatc taggacaggt ttgggggtaa agtagcggga gtggtaggag 1620
153 aagggctggg ttatggatg gcgggaggag tagtttacat aggggtcata ggtgagggtc 1680
155 gtggcctttg ttacaaagtt atcatctaga ataacagcac tggagccac tcccctgtca 1740
157 cctgggtga tcggggagca gggccag 1767
160 <210> SEQ ID NO: 3
161 <211> LENGTH: 1768
162 <212> TYPE: DNA
163 <213> ORGANISM: Porcine circovirus
165 <400> SEQUENCE: 3
166 aattcaacct taaccttttt tattctgtag tattcaaagg gtatagagat tttgttggtc 60
168 cccctccccg ggggaacaaa gtcgtcaata ttaaatctca tcatgtccac cgcccaggag 120
170 ggcgttttga ctgtggttag cttgacagta tatccgaagg tgcgggagag gcgggtgttg 180
172 aagatgccat ttttccttct ccaacggtag cgggtgcggg ggtggacgag ccaggggcgg 240
174 cggcgaggga tctggccaag atggctgcgg gggcggtgtc ttcttctcgg gtaacgcctc 300
176 cttggatacg tcatagctga aaacgaaaga agtgcgctgt aagtattacc agcgcacttc 360
178 ggcagcggca gcacctcgcc agcacctcag cagcaacatg cccagcaaga agaattggaag 420

```

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/680,228

DATE: 04/05/2001

TIME: 09:03:49

Input Set : A:\ES.txt

Output Set: N:\CRF3\04052001\I680228.raw

```

180 aagcggaccc caaccacata aaaggtgggt gttcacgctg aataatcctt ccgaagacga 480
182 gcgcaagaaa atacgggagc tcccaatctc cctatttgat tattttattg ttggcgagga 540
184 gggtaatgag gaaggacgaa cacctcacct ccaggggttc gctaattttg tgaagaagca 600
186 aacttttaaat aaagtgaagt ggtatttggg tgcccgtctg cacatcgaga aagccaaagg 660
188 aactgatcag cagaataaag aatattgcag taaagaaggc aacttactta ttgaatgtgg 720
190 agctcctcga tctcaaggac aacggagtga cctgtctact gctgtgagta ccttgttggg 780
192 gagcgggagt ctggtgaccg ttgcagagca gcacctgtg acgtttgtca gaaatttccg 840
194 cgggctggct gaacttttga aagtgaaggc gaaaatgcag aagcgtgatt ggaagaccaa 900
196 tgtacacgtc attgtggggc cacctgggtg tggtaaaagc aaatgggctg ctaattttgc 960
198 agacccggaa accacatact ggaaaccacc tagaaacaag tgggtgggatg gttaccatgg 1020
200 tgaagaagtg gttgttattg atgactttta tggtggctg ccgtgggatg atctactgag 1080
202 actgtgtgat cgatatccat tgactgtaga gactaaaggc ggaactgtac cttttttggc 1140
204 ccgcagtatt ctgattacca gcaatcagac cccgttgga tgggtactct caactgctgt 1200
206 ccagctgta gaagctctct atcggaggat tacttccttg gtattttgga agaatgctac 1260
208 agaacaatcc acggaggaag ggggccagtt cgtcacctt tccccccat gccctgaatt 1320
210 tccatgatga ataaattact gagtctttt tatcacttcg taatggtttt tattattcat 1380
212 ttagggttta agtgggggt ctttaagatt aaattctctg aattgtacat acatgggttac 1440
214 acggatattg tagtctgtg cgtatatact gttttcgaac gcagtgccga ggcctacgtg 1500
216 gtccacatth ctagaggttt gtagcctcag ccaaagctga ttcttttgt tatttggttg 1560
218 gaagtaatca atagtggagt caagaacagg tttgggtgtg aagtaacggg agtggttagg 1620
220 gaagggtttg gggattgtat ggcgggagga gtagtttaca tatgggtcat aggttagggc 1680
222 tgtggccttt gttacaaagt tatcatctag aataacagca gtggagccca ctcccctatc 1740
224 accctgggtg atgggggagc agggccag 1768
227 <210> SEQ ID NO: 4
228 <211> LENGTH: 1768
229 <212> TYPE: DNA
230 <213> ORGANISM: Porcine circovirus
232 <400> SEQUENCE: 4
233 aattcaacct taacctttct tattctgtag tattcaaagg gtatagagat tttgttggtc 60
235 cccctcccg ggggaacaaa gtcgtcaatt ttaaactca tcatgtccac cgcccaggag 120
237 ggcgttgtga ctgtgttacg cttgacagta tatccgaagg tgcgggagag gcgggtgttg 180
239 aagatgccat ttttcttctt ccaacggtag cgggtggcgg ggtggacgag ccaggggcgg 240
241 cggcggagga tctggccaag atggctgcgg ggcgggtgtc ttcttctgcg gtaacgcctc 300
243 cttggatacg tcatagctga aaacgaaaga agtgcgtgt aagtattacc agcgcacttc 360
245 ggcagcggca gcacctcggc agcacctcag cagcaacatg ccagcaaga agaatggaag 420
247 aagcggaccc caaccacata aaaggtgggt gttcacgctg aataatcctt ccgaagacga 480
249 gcgcaagaaa atacgggagc tcccaatctc cctatttgat tattttattg ttggcgagga 540
251 gggtaatgag gaaggacgaa cacctcacct ccaggggttc gctaattttg tgaagaagca 600
253 aacttttaaat aaagtgaagt ggtatttggg tgcccgtctg cacatcgaga aagccaaagg 660
255 aactgatcag cagaataaag aatattgcag taaagaaggc aacttactta ttgaatgtgg 720
257 agctcctcga tctcaaggac aacggagtga cctgtctact gctgtgagta ccttgttggg 780
259 gagcgggagt ctggtgaccg ttgcagagca gcacctgtg acgtttgtca gaaatttccg 840
261 cgggctggct gaacttttga aagtgaaggc gaaaatgcag aagcgtgatt ggaagaccaa 900
263 tgtacacgtc attgtggggc cacctgggtg tggtaaaagc aaatgggctg ctaattttgc 960
265 agacccggaa accacatact ggaaaccacc tagaaacaag tgggtgggatg gttaccatgg 1020
267 tgaagaagtg gttgttattg atgactttta tggtggctg ccgtgggatg atctactgag 1080
269 actgtgtgat cgatatccat tgactgtaga gactaaaggc ggaactgtac cttttttggc 1140
271 ccgcagtatt ctgattacca gcaatcagac cccgttgga tgggtactct caactgctgt 1200
273 ccagctgta gaagctctct atcggaggat tacttccttg gtattttgga agaatgctac 1260

```

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/680,228

DATE: 04/05/2001

TIME: 09:03:49

Input Set : A:\ES.txt

Output Set: N:\CRF3\04052001\I680228.raw

```

275 agaacaatcc acggaggaag ggggccagtt cgtcaccctt tcccccccat gccctgaatt 1320
277 tccatatgaa ataaattact gagtcttttt tatcacttcg taatggtttt tattattcat 1380
279 ttagggttta agtggggggt ctttaagatt aaattctctg aattgtacat acatggttac 1440
281 acggatatgg tagtcctggg cgtatttact gttttcgaac gcagcgccga gccctacgtg 1500
283 gtccacatgt ccagagggtt gtagtctcag ccaaagctga ttcttttgtg tatttggttg 1560
285 gaagtaatca atagtggagt caagaacagg tttgggtgtg aagtaacggg agtggttagga 1620
287 gaaggggttg gggattgtat ggcgggagga gtagtttaca tatgggtcat aggttagggc 1680
289 tgtggccttt gttacaaagt tatcatctag aataacagca gtggagccca ctcccctatc 1740
291 accctgggtg atgggggagc agggccag 1768
294 <210> SEQ ID NO: 5
295 <211> LENGTH: 1759
296 <212> TYPE: DNA
297 <213> ORGANISM: Porcine circovirus
299 <400> SEQUENCE: 5
300 aattcatatt tagcctttct aatacggtag tattgaaag gtaggggtag ggggttggtg 60
302 ccgcctgagg gggggaggaa ctggccgatg ttgaatttga ggtagttaac attccaagat 120
304 ggctgcgagt atcctccttt tatggtgagt acaaattctg tagaaaggcg ggaattgaag 180
306 ataccctgtc ttccggcgca tctgtaacgg tttctgaagg cggggtgtgc caaatatggt 240
308 cttctccgga ggatgtttcc aagatggctg cggggcgagg tccttcttct gcggtaacgc 300
310 ctcttggcc acgtcatcct ataaaagtga aagaagtgcg ctgctgtagt attaccagcg 360
312 cacttcggca gcggcagcac ctccggcagc tcagtgaaaa tgccaagcaa gaaaagcggc 420
314 ccgcaacccc ataagagggt ggtgttcacc cttaataatc ctccgagga ggagaaaaac 480
316 aaaatacggg agcttccaat ctcccttttt gattattttg tttgcggaga ggaaggtttg 540
318 gaagagggtg gaactcctca cctccagggg tttgcgaatt ttgctaagaa gcagactttt 600
320 aacaagggtg agtggtatgt tgggtcccgc tgccacatcg agaaagcgaa aggaaccgac 660
322 cagcagaata agaatactg cagtaaagaa ggccacatac ttatcgagtg tggagctccg 720
324 cggaaccagg ggaagcgag cgacctgtct actgctgtga gtacctttt ggagacgggg 780
326 tctttggtga ctgtagccga gcagttccct gtaacgtatg tgagaaattt ccgcgggctg 840
328 gctgaacttt tgaaagttag cgggaagatg cagcagcgtg attggaagac agctgtacac 900
330 gtcatagttg gcccgcccg ttgtgggaag agccagtggg ccgtaattt tgcagacct 960
332 agggacacct actggaagcc tagtagaaat aagtgggtgg atggatatca tggagaagaa 1020
334 gttgttgttt tggatgattt ttatggctgg ttaccttggg atgatctact gagactgtgt 1080
336 gaccggtatc cattgactgt agagactaaa ggggtactg ttcttttttt ggcccgagt 1140
338 attttgatta ccagcaatca ggccccccag gaatggtact cctcaactgc tgtcccagct 1200
340 gtagaagctc tctatcggag gattactact ttgcaatttt ggaagactgc tggagaacaa 1260
342 tccacggagg taccggaag ccgatttgaa gcagtggacc caccctgtgc ccttttccca 1320
344 tataaaataa attactgagt cttttttgtt atcacatcgt aatgggtttt atttttattt 1380
346 atttagaggg tcttttagga taaattctct gaattgtaca taaatagtca gccttaccac 1440
348 ataatttttg gctgtggctg cattttggag cgcatacgcc aggcctgtgt gctcgacatt 1500
350 ggtgtgggta tttaaatgga gccacagctg gtttctttta ttatttgggt ggaaccaatc 1560
352 aattgttttg tccagctcag gtttgggggt gaagtacctg gtagtgtagg taaagggctg 1620
354 ccttatggtg tggcgggagg agtagttaat ataggggtca taggccaagt tggtagggg 1680
356 ggttacaaag ttggcatcca agataacaac agtggaccca acacctcttt gattagagg 1740
358 gatgggtct ctggggtaa 1759
361 <210> SEQ ID NO: 6
362 <211> LENGTH: 1768
363 <212> TYPE: DNA
364 <213> ORGANISM: Porcine circovirus
366 <220> FEATURE:

```

RAW SEQUENCE LISTING
 PATENT APPLICATION: US/09/680,228

DATE: 04/05/2001
 TIME: 09:03:49

Input Set : A:\ES.txt
 Output Set: N:\CRF3\04052001\I680228.raw

```

367 <221> NAME/KEY: misc_feature
368 <222> LOCATION: (1)..(1768)
369 <223> OTHER INFORMATION: nucleotide "n" can be either of the nucleotides 'a', 'c', 'g' or
370      "t"
373 <400> SEQUENCE: 6
374 gaattcaacc ttaacctttt ttattctgta gtattcaaag ggtataaaga ttttggtggt      60
376 cccccctccc gggggaacaa agtcgtcaat attaaatctc atcatgtcca ccgccagga      120
378 gggcggttctg actgtggtag ccttgacagt atatccgaag gtgcgggaga rgcggtgtt      180
W--> 380 gaaaatgcc a ttttctctc tccaacggta gcggtggcgg ggggtggacma nccacggggc      240
382 gcggcggawg atctggccaa gatggctgcg ggggcgggtg cttcttctgc ggtaacgcct      300
384 ccttggatac gtcatagtcg aaaacgaaag aagtcgctg taagtattac cagcgcactt      360
386 gcgcagcggc agcacctcgg cagcacctca gcagcaacat gccagcaag aagaatggaa      420
388 gaagcggacc ccaaccacat aaaaggtggg tgttcacgct gaataatcct tccgaagacg      480
390 agcgcaagaa aatacgggag ctcccaatct ccctatttga ttattttatt gtggcgagg      540
W--> 392 aggggtwtga ggaangacga acacctcacc tccaggggtt cgctaatttt gtgaagaagc      600
394 aaacttttaa taaagtgaag tggattttgg gtgcccgctg ccacatcgag aaagccaaag      660
396 gaactgatca gcagaataaa gaattttgca gtaaagaagg caacttactt attgaatgtg      720
398 gagctcctcg atctcaagga caacggagtg acctgtctac tgcgtgtagt acctgttg      780
400 agagcgggag tctggtgacc gttgcagagc agcaccctgt aacgtttgtc agaaatttcc      840
402 gcgggctggc tgaacttttg aaagtgcgag ggaataatgca gaagcgtgat tggagacca      900
404 atgtacacgt cattgtgggg ccacctgggt gtggtaaaag caaatgggct gctaattttg      960
406 cagacccgga aaccacatac tggaaaccac ctagaacaa gtggtgggat ggttaccatg      1020
408 gtgaagaagt ggttgttatt gatgactttt atggctggct gccgtgggat gatctactga      1080
W--> 410 gactgtgtga tgcatatcca ttgactgtag agactaaagg tggactgta cnnnnnnngg      1140
412 cccgcagtat tctgattacc agcaatcaga ccccggttga atggtaactc tcaactgctg      1200
414 tcccagctgt agaagctctc tatcgaggga ttacttccct ggtattttgg aagaatgcta      1260
W--> 416 cagaacaatc cacggaggaa gggggccagt tngtcacct ttcccccca tgcctgaat      1320
418 ttccatatga aataaattac tgagtccttt ttatcacttc gtaatgggtt ttattattca      1380
420 tttagggttt aagtgggggg tctttaagat taaattctct gaattgtaca tacatggtta      1440
422 cacggatatt gtagtcctgg tcgtatatac tgttttcgaa cgcagtgccg aggcctacgt      1500
424 ggtccacatt tctagaggtt ttagccctca gccaaagctg attccttttg ttatttggtt      1560
426 ggaagtaatc aatagtggag tcaagaacag gtttggtgtg gaagtaacgg gagtggtagg      1620
428 agaaggggtg ggggattgta tggcgggagg agtagtttac atatgggtca taggttaggg      1680
430 ctgtggcctt tgttacaaag ttatcatcta gaataacagc agtggagccc actcccctat      1740
432 caccctgggt gatgggggag cagggcca      1768
435 <210> SEQ ID NO: 7
436 <211> LENGTH: 1768
437 <212> TYPE: DNA
438 <213> ORGANISM: Porcine circovirus
440 <220> FEATURE:
441 <221> NAME/KEY: misc_feature
442 <222> LOCATION: (1)..(1768)
443 <223> OTHER INFORMATION: nucleotide "k" can be either "g" or "t" and
444      nucleotide "y" can be either "c" or "t"
447 <400> SEQUENCE: 7
448 accagcgac ttcggcagcg gcagcacctc ggcagcacct cagcagcaac atgccagca      60
450 agaagaatgg aagaagcgga cccaaccac ataaagggtg ggtgttcacg ctgaataatc      120
452 ctccgaaga cgagcgcaag aaaatacggg agctcccaat ctccctattt gattatttta      180
454 ttgttgcgca ggagggtaat gaggaaggac gaacacctca cctccagggg ttcgctaatt      240

```

VERIFICATION SUMMARY

PATENT APPLICATION: US/09/680,228

DATE: 04/05/2001

TIME: 09:03:50

Input Set : A:\ES.txt

Output Set: N:\CRF3\04052001\I680228.raw

L:380 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:392 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:410 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6
L:416 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:6